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MITRE GEOPHYSICS PTY LTD
MINERAL EXPLORATION AND ENGINEERING CONSULTANTS
BUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-363143

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A REPORT ON

EXCHANGE OF DIGHEM INFORMATION

for

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THE MOUNT LYELL MINING AND RAILWAY COMPANY LIMITED

by

Dr. J. R. Bishop

November, 1980

OBJECTS AND METHODS

An evaluation of the DIGHEM survey flown for Mount Lyell in March, 1980, is being undertaken. The results over all three areas (Henty-Yolande, Lynch Creek and Selina) were disappointing, there being very few unexpected anomalies. It was decided to try and examine the results of other Dighem surveys within Tasmania to be able to compare Mount Lyell's results and to gain a wider experience of the method's capabilities.

RESULTS

Aberfoyle, BHP, CRA and Geopeko all used the Dighem AEM system in the last field season, and there may have been others.

Data from Aberfoyle, CRA and Geopeko surveys were examined; the latter two, the plans only since the profiles are not kept in Tasmania. Results from the survey over Que River were made available by BHP (who apparently retained right of ownership) in exchange for copies of the Mount Lyell data. Results from the Dighem survey(s?) over BHP held areas were not examined, but were briefly discussed.

Aberfoyle

Aberfoyle flew over three areas in western Tasmania. They were (1) the Queen Hill area (2) the St. Dizier area and (3) the 'Circular feature' area. This last area is on the Aberfoyle lease south west of Waratah and is an "air-photo interp" anomaly.

The survey over the old Queen Hill mine produced an X_s type Dighem anomaly, i.e. a possible conductor at the surface (plus a magnetic response). A more positive anomaly was obtained over the Oonah deposit a few km away. The sediments in the area were of fairly low resistivity (down to 250 ohm-m?).

In the St. Dizier survey, granite, basalts and sediments were flown over. Several interesting looking anomalies were obtained in the sediments near the granite contact, often with associated magnetic responses. These skarn-type targets also occurred in the neighbouring Renison lease. However, the strongest Dighem anomalies were obtained in the basalts. The basalts were of lower resistivity than the surrounding rocks - the 1000 ohm-m contour being a rough indication of the basalt's extent. There was little if any contrast in resistivities between the granites and sediments, both being quite resistive (1000 ohm-m?).

The 'circular feature' survey area also contained basalts and similar results (low resistivity plus magnetics and strong anomalies) to the St. Dizier survey were obtained. The survey also flew over Cambrian volcanics which again had a high resistivity and over (the Meredith) granite which, like the St. Dizier survey, showed some EM anomalies in a resistive background: the granite itself having little magnetic response.

CRA

The CRA survey was over the Balfour area (in joint venture with Geopeko). The area is now a tin target for CRA but was originally a copper working called Murray's Reward. The tin is in quartz veins in quartzites and so is not thought to be a replacement-type deposit. Dighem did not respond to either the copper or the tin mineralised areas. However three lines of responses were obtained, two very strong and one weak. These are all thought to be due to black shales. The anomalies included several of grade 4 (20-49 mhos) with responses in the standard receiver in-phase and out-of-phase channels greater than 20 ppm (the highest classification). By contrast, the responses over the Selina black shales are up to grade 2 (a maximum of 9 mhos) with only one anomaly showing similarly high responses - all the others being considerably less.

Geopeko

Geopeko flew over their Mackintosh east lease (north east of Tullah) which includes a belt of Mt. Read Volcanics with adjacent pre Cambrian and Ordovician sediments. Much of the area is covered by Tertiary basalt. The volcanics are uniformly resistive. The responses over the basalts were very similar to those described above.

Targets in this survey included skarn-type mineralisation in Ordovician limestones and stock work tin deposits in the pre Cambrian sediments east of the Mt. Read Volcanics.

Ross Large, Geopeko's supervising geologist, made a few comments regarding their surveys; the acid volcanics were resistive overall but there are anomalies in favourable locations. These anomalies are not as large as the responses from the Balfour black slates. Geopeko has about 30 anomalies to follow up and for this they are using a 'Moving Source Turam'(MST) system which consists of three hand held coils; one transmitting and two receiving.

Depth of penetration is probably about 50 m, however the system, based on Scintrex's 5-frequency Turam, permits a similar frequency and geometry to Dighem to be used. The system has been judged as relatively easy to use in typical West Coast conditions. A test run was conducted over Que River where it responded to the "S" body; the other lens was not surveyed. Geopeko's philosophy of using a near comparable EM system to locate the anomalies on the ground is to be commended. The Slingram method (McPhar VHEM in horizontal mode) more closely resembles the Dighem geometry and can be used in either standard or whale tail mode, but it suffers from topographic effects.

Geopeko have followed up X type anomalies (a possible conductor) and in at least one case, a MST response has been obtained (cause not yet determined).

DISCUSSION WITH GEOPHYSICISTS

Discussions were held with Aberfoyle's geophysicist Jovan Silic and a BHP geophysicist, Guido Staltari.

Silic showed me the profiles from the various Dighem surveys conducted for Aberfoyle. These profiles were generally very 'active' with some quite large responses due to conductive formations, some local black shale units, and possibly some mineralisation. However Silic was still interested in some very small responses, although these were often in association with much larger ones - offshoots of ore perhaps. Generally Silic's task was to reject anomalies and recommend only those that were worthwhile - i.e. too many rather than too few anomalies.

Staltari commented that he too had interpreted anomalies not picked by the Dighem computer, but that follow-up had not yet found any to be of interest - except for one, where Dighem was flown over mineralisation near Scamander known to have a conductance of 30 mhos (i.e. very conductive). Dighem personnel were not told about the mineralisation and the anomaly, of the order of 2 ppm, was not picked (i.e. no indication at all on the conductance or anomaly picking channels). The mineralisation apparently lies in a creek bed between two steep hills and it was passed over at a height of probably at least 120 m, however a larger response would be expected. Another possible reason for the poor response is inaccuracy of flight line recovery and this is being checked - it has been found to be very good on previous checks. Only one flight line flew over this body.

Both Silic and Staltari have spent a considerable amount of time interpreting Dighem surveys and with regard to Mount Lyell's surveys they agreed that the data should be examined for small anomalies not picked by the computer. They also agreed that while there was usually a good explanation for the anomalies that were picked but rejected(often noise in the standard in-phase receiver channel, probably caused by aerodynamic stresses in the bird, and/or by sferics), these should probably be plotted anyway in this case.

Silic stated that the filtering of the results could sometimes produce a spurious (small) anomaly, which if suspected, should be checked on the analog records. A worthwhile anomaly should occur on in-phase and out-of-phase channels on both the standard and whale tail receivers.

Overlays with flight lines have been prepared for the Henty-Yolande, Selina and Lynch Creek areas, and all possible anomalies are being marked on to these plans. These will be evaluated and interpreted.

John Bishop

J. R. Bishop

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